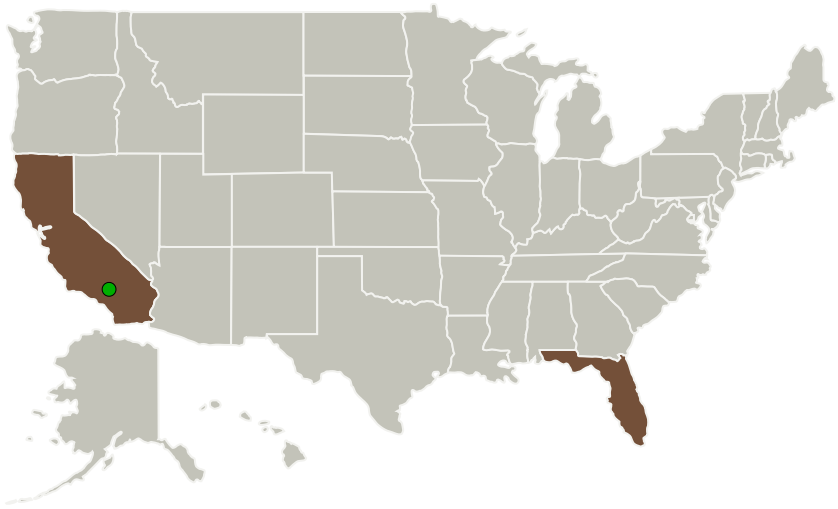
Electromagnetic Rotor Torque Check, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

In order to achieve a high payoff turbopump with a low investment, the modern turbopump in today's space propulsion program is required to have greater life, with lower maintenance costs. In order to achieve lower maintenance costs, the turnaround time between mission cycles must be kept to a minimum. At each cycle, one item on the maintenance checklist to be conducted is rotor torque. In order for a turbopump to be returned to service, among other requirements, it must be clear of all FOD as well as damage to the rotor or bearings. One maintenance check that is a valid indicator of FOD or rotor and bearing damage is a rotor torque check. Failure of a turbopump due to rotor or bearing damage may lead to an event categorized as a Criticality 1 (Loss of Life or Vehicle) failure mode. In most modern turbopumps, performing a rotor torque check involves timely and costly maintenance procedures. In many cases, inlet piping or structural cases must be removed to expose the turbopump rotor. As each piece of hardware is reinstalled, they routinely must undergo lengthy quality checks to ensure proper assembly and function. FTT proposes development of a means to measure the rotor torque through the use of an electromagnetic drive device. Similar to a DC electrical motor, the new component would be powered and cause the rotor to rotate. After recording measurements of the rotor speed and electromagnet input power, the rotor torque could be calculated. Incorporating a device such as this into a turbopump would reduce time associated with torque measurements from days to seconds.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Florida Turbine Technologies, Inc.	Lead Organization	Industry	Jupiter, Florida
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
California	Florida

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138121)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Florida Turbine Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

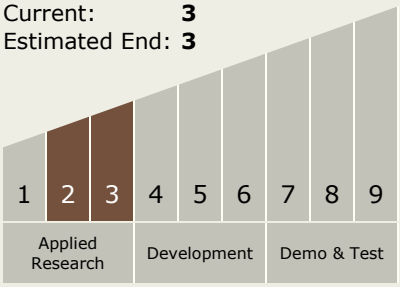
Carlos Torrez

Principal Investigator:

Andrew Wall

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.4 Solids

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System